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A COMPARATIVE STUDY OF THREE DIFFERENT DOSES [7.5 MG, 8.75 MG, 10MG] OF 0.5% HYPERBARIC BUPIVACAINE IN WOMEN UNDERGOING CAESAREAN SECTION UNDER SPINAL ANESTHESIA

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ABSTRACT

Spinal anesthesia is preferred method of anesthesia for elective and for many emergencies caesarean sections and 0.5% hyperbaric Bupivacaine is most commonly used drug in spinal anesthesia for caesarean sections. The study was conducted in 90 female patients age 18-35 years, were divided in 3 groups, 30 patients in each group, who were scheduled for caesarean section. All the patients with significant systemic illness were excluded from study and only ASA I and II Patients were included in the study. None of the patients has any contraindications to spinal anesthesia. This study was undertaken to compare and evaluate efficacy (need of analgesic supplementation) and adverse effects (hypotension, nausea/vomiting) of spinal bupivacaine in low dose (7.5mg and 8.75mg) compared with conventional dose (10mg) for elective Caesarean delivery. Increasing the dose of Bupivacaine has faster onset and prolongs the duration of sensory and motor blockade, prolongation in the duration of effective analgesia but increasing the dose of Bupivacaine compromised the Hemodynamic stability. There is increased incidence of hypotension, nausea, vomiting with increased dose of Bupivacaine. Low dose spinal anesthetic technique works effectively in most cases and in some institute it is a standard practice as earlier post-operative ambulation and great maternal satisfaction because of reduced motor block.

Key words: Spinal anesthesia, Caesarean section, Bupivacaine.

INTRODUCTION

Spinal anesthesia is the commonest anesthetic technique for lower abdomen and lower limb surgery. It is easy to perform and provide fast onset and effective motor and sensory block. Local anesthetics have been traditionally used for instituting subarachnoid block [1].

Resurgence of spinal anesthesia as a popular technique was possible due to development of small bore needles with pencil point tips and has become the preferred method of anesthesia for elective and for many emergency Caesarean sections if an epidural catheter is not already in situ. While effective surgical anesthesia is the primary objective of the spinal anesthesia, it must be accomplished while minimizing maternal and neonatal side effects [2].

Although various factors influence the appropriate sensory nerve block for surgical anesthesia, the local anesthetic dose is the main determinant of its success. Anesthesia textbooks recommend bupivacaine in a dose of between 10 and 12 mg. however, the use of this dose range has been associated with an incidence of maternal arterial hypotension of 69% to >80%, resulting in maternal and neonatal morbidity. A number of studies have sought an optimal dose of bupivacaine, but produced dissimilar findings with doses ranging from 5 to 15 mg. The use of a lower dose aims to decrease maternal side effects (hypotension, intraoperative nausea/vomiting). However such a strategy could compromise the adequacy of

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anesthesia, and require supplementary analgesia, with possible neonatal consequences and may require conversion to general anesthesia, a situation known as a risk factor for anesthesia related maternal morbidity and mortality [3].

This study was undertaken to compare and evaluate efficacy (need of analgesic supplementation) and adverse effects (hypotension, nausea/vomiting) of spinal bupivacaine in low dose (7.5mg and 8.75mg) compared with conventional dose (10mg) for elective Caesarean delivery [4].

AIM OF STUDY

1. To evaluate the motor and sensory effect of conventional dose and low dose of Inj.Bupivacaine for spinal anaesthesia in caesarean section.
2. To compare the efficacy of spinal anaesthesia in caesarean section with different doses of Bupivacaine.
3. To compare the adverse effects of spinal anaesthesia in caesarean section with different doses of Bupivacaine.
4. To supplement the I.V. analgesia or General Anaesthesia in different doses of Bupivacaine.
5. To observe the haemodynamic changes during spinal anaesthesia with different doses of Bupivacaine.
6. To treat the complications of spinal Bupivacaine in caesarean section with different doses of Bupivacaine.

MATERIAL AND METHODS

Informed consent was obtained from all the patients who were a part of this study. The study was conducted in 90 female patients, aged 18-35 years, who were scheduled for caesarean section. All the patients with significant systemic illness were excluded from the study and only ASA I and II patients were included in the study. None of the patients had any contraindications to spinal anesthesia [5].

Inclusion criteria

- Age between 18 years to 35 years
- Patients who are NBM for 8 hours
- ASA physical status I and II

Exclusion criteria

- Pre-eclampsia and eclampsia
- Anaemia
- Diabetes
- Any major systemic disease
- Refusal by patient for regional anaesthesia or procedure
- ASA risk III or more

Pre-anesthetic check-up was done on the previous day and before induction. Detailed history of present complaints, significant past, family and personal history was taken. General and systemic examination was done and vitals recorded. Routine and specific investigations were noted. All the patients were explained in general terms the procedure of the study and their queries were answered.

Upon entering the operation theatre, all standard monitors (ECG, NIBP and SpO_2) were applied and the baseline blood pressure, pulse rate, oxygen saturation and respiratory rate were recorded. Intravenous line was secured with an 18G or 20G cannula. Inj. Ondansetron 0.15 mg/kg I.V. was given to all the patients. All the patients were preloaded with 15 ml/kg ringer lactate solution. Sub arachnoid block was then performed under aseptic and antiseptic precautions with the patients in the lateral or sitting position, after local infiltration with 2 ml of 2% lignocaine. In the L2-L3 or L3-L4 interspace, drug dose according to the assigned groups was injected through 23G spinal needle after the aspiration of clear, free flow of CSF with the bevel facing cephalic. Then the patient was turned supine and was kept at 15^{o}Trendelenburg position.

The onset of sensory blockade was assessed by pin prick method. A sensory level of T6 was considered adequate to allow surgery to proceed. Time to onset of T6 sensory level was recorded. Time to regression of sensory blockade from T6 to L1 was recorded which was considered as the duration of sensory blockade [6].

The time to onset of complete motor blockade was recorded as the time to achieve modified bromage scale grade-III. The duration of motor block was time to achieve modified bromage scale grade 0 from modified bromage scale III.

Modified bromage scale:

Grade 0: Able to move hip, knees and ankle.

Grade I: Unable to move hip, able to flex knees and ankle.

Grade II: Unable to move hip and knees, able to move ankle.

Grade III: Unable to move hip, knees and ankle.

Pain was assessed hourly using 10 cm visual analog scale (0 – no pain; 10 – worst pain). Duration of effective analgesia (time from sub arachnoid drug injection to the first dose of rescue analgesic) was recorded. I.V. Diclofenac sodium 2 mg/kg was given as the rescue analgesic if the pain score was 4 or more.

Episode of perioperative hypotension (mean arterial blood pressure < 70 mmHg or 20% or more reduction from baseline) was treated with fast infusion of i.v. fluids and Inj. Mephentermine 6mg intravenous in incremental doses.Bradycardia (pulse <60/min) was treated with Inj. Atropine 0.6 mg i.v.Peri-operative emetic response was recorded. Inj. Metoclopramide 10 mg i.v. was given as rescue antiemetic.

All the observations were recorded and the results were analyzed and data are presented as mean ± S.D. for comparing data between three groups. ANOVA test (Analysis of variance) was used and p values <0.05 were interpreted as clinically significant [7].

RESULTS

The study was conducted in 90 patients (n=30

each) of ASA grade I and II posted for lower segment caesarean section. The patients received following doses of drugs intrathecally:

Group A: Inj. Bupivacaine hyperbaric 7.5 mg (0.5%)
Group B: Inj. Bupivacaine hyperbaric 8.75mg (0.5%)
Group C: Inj. Bupivacaine hyperbaric 10 mg (0.5%).

Fig 1. Mean onset time (in minute) of sensory and motor blockade

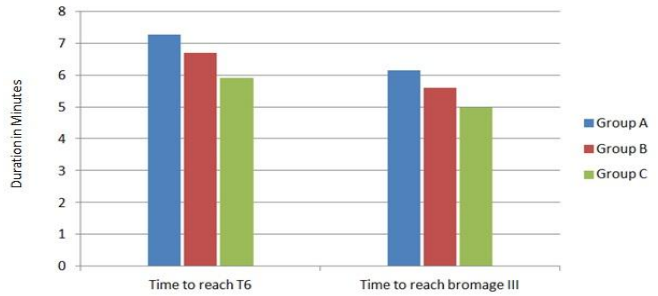

Fig 2. Duration(in minutes) of sensory and motor blockade

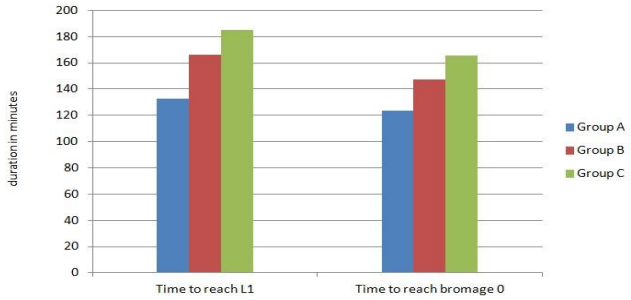

Fig 3. Duration of Effective Analgesia

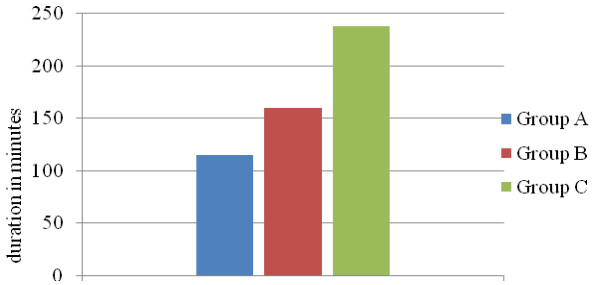

Fig 4. Changes in pulse rate

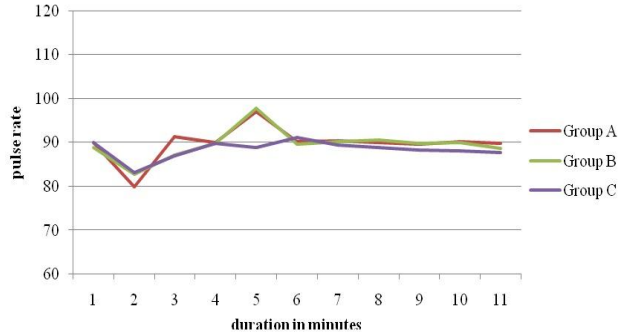

Figure 5. Changes in Systolic blood pressure

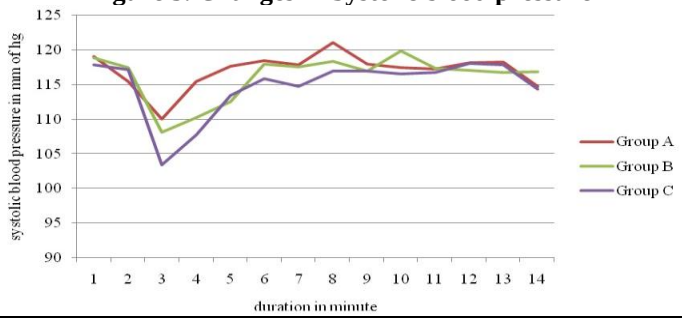

Table 1. Demographics

Variables	Group A	Group B	Group C
Age (years) (Mean±SD)	24.50±3.92	25.2±4.05	23.83±3.95
Wt. (kg) (Mean±SD)	62.67±3.17	63.1±2.94	58.77±3.4
Ht. (cm) (Mean±SD)	153.57±3.56	157.05±5.41	160.48±3.70
ASA Grading (I/II)	19/11	21/9	20/10

Table 2. Duration of Surgery

Duration (min)	Group A	Group B	Group C
45-60	11	9	14
61-90	15	14	13
91-120	4	7	3
Total	30	30	30
Mean ± SD(min)	73.17±18.36	77.83±22.54	69.67±19.61
p value >0.05*			

Table 3. Mean onset time (in minutes) of sensory and motor blockade

	Group A	Group B	Group C
Time to reach T6	7.26±17.80	6.69±17.80	5.91±17.80
Time to reach bromage III	6.15±17.80	5.60±17.80	4.97±17.80

Table 4. Duration (in minutes) of sensory and motor blockade

	Group A	Group B	Group C
Time to reach L1	132.67±17.80	165.98±24.57	184.67±24.74
Time to reach bromage 0	123.33±23.09	147.00±11.79	165.32±29.69

Table 5. Duration of Effective Analgesia

	Group A	Group B	Group C
Duration (min)	114.83±20.32	159.67±24.14	237.95±24.94

Table 6. Perioperative Complications

	Group A	Group B	Group C
Hypotension(MAP≤70)	0	3(10%)	6(20%)
Bradycardia(HR≤60)	0	0	0
Nausea	1 (3.33%)	2(6.66%)	2(6.66%)
Vomiting	0	0	1(3.33%)
Pruritus	0	0	0
Respiratorydepression	0	0	0

DISCUSSION

A major consideration is spinal anesthesia-induced maternal hypotension, which occurs in up to three quarters of women in the absence of prophylactic measures. In addition to it, hypotension induced maternal nausea and vomiting, impaired uteroplacental perfusion can lead to fetal acidemia. Strategies to avoid or limit spinal-induced hypotension include:

- giving intravenous fluid;
- administering vasopressor drugs,
- Positioning the mother.

Degree of arterial hypotension correlate with the level of sympathetic block which is 2-4 segment higher than level of anesthesia. Again spread of LA in Subarachnoid space depends on dose, volume, baricity of the drug, position of patient, site of injection, speed of injection and direction of needle [9].

In our study we have tried to achieve level of spinal blockade at T6 level in each group and in majority of cases we have achieved T6 level.

As there is either L2-L3 or L3-L4 space is selected for subarachnoid block in all patients in we have preloaded all patients 10-15 ml/kg ringer lactate and as the position of operation table is fixed, there are no major changes in heart rate and blood pressure in all three groups due to this.

The frequency and degree of hypotension is influenced by the dose of subarachnoid local anesthetic so it is not surprisable that the literature is replete with studies using lower doses than conventionally described. 'Low' intrathecal anesthetic doses for LSCS can be effective but sometimes initial distribution of drug may be unsatisfactory and this can lead to inability to maintain the block for prolong surgery [10].

Lower dose of intrathecal hyperbaric bupivacaine is likely to reduce the incidence of hypotension and possibly the severity of its subsequent maternal effects, but at the same time there are possibilities of slower onset and shorter duration of spinal blockade with an increased risk of intra-operative pain, requirement for supplementation and possibly, need of general anesthesia. Yet to be substantiated there are additional advantages such as earlier postoperative ambulation and greater maternal satisfaction because of reduced motor block. So low-dose spinal anesthetic technique works effectively in most cases and in some institutes it's a standard practice.

CONCLUSION

1. Increasing the dose of bupivacaine has faster onset and prolong the duration of sensory and motor blockade.
2. As the dose of bupivacaine increases there is prolongation in the duration of effective analgesia.
3. Increasing the dose of bupivacaine compromises the haemodynamic stability in the perioperative period. There is increased incidence of hypotension, nausea and vomiting with increased dose of bupivacaine.
4. There was no significant incidence of perioperative complications in any of the group.
5. In lower doses there is increased haemodynamic stability at cost of Intraoperative pain and need of general anaesthesia in some cases.

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CONFLICT OF INTEREST:
The authors declare that they have no conflict of interest.

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